UNIVERSITY OF LIVERPOOL

Architectural Engineering BEng (Hons)

COURSE DETAILS

- A level requirements: AAB
- UCAS code: HK26
- Study mode: Full-time
- Length: 3 years

KEY DATES

- Apply by: 31 January 2024
- Starts: 23 September 2024

Course overview

Architectural Engineering is for students who wish to work at the intersection of architecture and structural engineering. At the end of your degree, you will be able to apply engineering principles to the planning, design and construction of the built environment.

INTRODUCTION

The Architectural Engineering degree is a multidisciplinary degree, encompassing civil engineering and architecture jointly delivered by the School of Engineering and the School of Architecture.

Architectural engineers are responsible for the design of different systems within a building or an aspect of critical infrastructure with a particular focus on key areas.

As a student, you will be provided with a multidisciplinary skill set to design building structures, bridges and critical infrastructure incorporating both the solid technical grounding that a typical civil/structural engineering degree provides; alongside a robust and wider appreciation of the architectural, societal, economic and environmental aspects associated to a particular design solution.

WHAT YOU'LL LEARN

- Create innovative design strategies
- Model and design heating, ventilation and air conditioning systems
- Acoustic performance and lighting design
- Hands-on construction experience
- Design building structures, bridges and critical infrastructures
- How to lead an individual research project

ACCREDITATION

The BEng degree is accredited as: (i) fully satisfying the educational base for an Incorporated Engineer (IEng) and (ii) partially satisfying the educational base for a Chartered Engineer (CEng). A programme of accredited further learning will be required to complete the educational base for CEng. See jbm.org.uk for further information and details of further learning programmes for CEng.

Course content

Discover what you'll learn, what you'll study, and how you'll be taught and assessed.

YEAR ONE

In the first year, students are required to take **MATH198**.

COMPULSORY MODULES

ENVIRONMENTAL DESIGN 1 (ARCH111)

Credits: 15 / Semester: semester 2

The module is an introduction to the principles of net zero carbon design.
It aims to give students an understanding of the role of a building as a modifier of climate with reference to traditional climatically responsive architecture, and the role of buildings in the context of global energy usage, environmental impact, climate change and net zero carbon design.

GEOMECHANICS 1 (CIVE120)

Credits: 7.5 / Semester: semester 2

The Geotechnical Engineer is responsible for the safe design of how a building or infrastructure asset interacts with the ground. This module introduces students to the role of the Geotechnical Engineer and the fundamental principles and concepts that form the basis of soil mechanics

ENGINEERING MATHEMATICS (MATH198)

Credits: 22.5 / Semester: whole session

MATH198 is a Year 1 mathematics module for students of programmes taught in the School of Engineering, e.g. Aerospace, Civil, Mechanical or Industrial Design Engineering. It is designed to reinforce and build upon A-level mathematics, providing you with the strong background required in your engineering studies and preparing you for the Year 2 mathematics module MATH299 (Mathematics engineering II). In the first semester, the foundations are laid: differential calculus, vector algebra, integration and applications. Semester two covers complex numbers, differential equations, Laplace transformations and functions of two variables

INTRODUCTION TO STRUCTURAL MATERIALS (ENGG108)

Credits: 7.5 / Semester: semester 1

This module introduces students to important mechanical properties of metallic alloys, polymers, ceramics, construction materials and composites used in engineering industry. It also introduces the mechanical testing techniques used to measure such properties, the common mechanisms of materials and component failure in use, and some appreciation of materials processing. The laboratory sessions are designed to familiase students with engineering laboratory methods and procedures, as well as providing an experience of hands-on mechanical testing techniques.

SOLIDS AND STRUCTURES 1 (ENGG110)

Credits: 15 / Semester: whole session

This module aims to introduce students to the fundamental concepts and theory of how engineering structures work to sustain loads. It will also show how stress analysis leads to the design of safer structures. It will also provide students with the means to analyse and design basic structural elements as used in modern engineering structures.

INTRODUCTION TO PROGRAMMING (ENGG185)

Credits: 7.5 / Semester: semester 1

This module introduces students to the basic concepts and principles of elementary statistics and programming. It explains the purposes and advantages of analysing data collected specifically to solve problems in engineering, reviews available software tools and programming languages used to formulate and answer basic engineering questions. It draws on examples from applications across the range of School of Engineering program areas.

DIGITAL SKILLS AND SURVEYING (CIVE101)

Credits: 15 / Semester: whole session

The primary aim is to introduce students to the ways that digital technology is used for surveying and recording and for design and documentation.
The secondary aim is to introduce students to the concept of Building Information Modelling (BIM) using industry standard software

CIVIL AND ARCHITECTURAL ENGINEERING PROJECTS (CIVE162)

Credits: 30 / Semester: whole session

This module provides students with an introduction to projects within the built environment, the roles of professional engineers, the professions they will interact with, and the skills required by a professional engineer operating in the built environment

Programme details and modules listed are illustrative only and subject to change.

YEAR TWO

During year two, you will have a week of real, hands-on construction experience at 'The Constructionarium'. The Constructionarium takes place at a six-hectare site, specifically designed and built to provide a range of challenging teaching and learning conditions for students.

COMPULSORY MODULES

ENGINEERING MATHEMATICS II (MATH299)

Credits: 7.5 / Semester: semester 1

To introduce some advanced Mathematics required by Engineers, Aerospace Engineers, Civil Engineers and Mechanical Engineers. To assist students in acquiring the skills necessary to use the mathematics developed in the module.

ENVIRONMENTAL DESIGN 2 (ARCH211)

Credits: 15 / Semester: semester 1

This module introduces students to energy and environmental issues, particularly those that must be faced by the discipline of architecture. The aim of this module is to provide an introduction to design of passive environmental systems for buildings, their integration into building fabric and structural systems, and selection of appropriate equipment and materials. Both the fundamentals and presentations of case studies (including lessons from the vernacular) will be used to enhance the understanding environmental simulation. The module will be delivered by weekly 2-hour lectures, and assessed by There are two mandatory components to the assessment: 1) Group Report on Vernacular Architecture (30% of total mark) 2) One-hour examination on all topics covered in the lecture series (70% of total mark).

FIELD THEORY, PARTIAL DIFFERENTIAL EQUATIONS & METHODS OF SOLUTION (MATH282)

Credits: 7.5 / Semester: semester 1

For XJTLU Students Only Maxwell's equations elegantly describe the physical laws governing such things as electrodynamics. Related problems may be posed in terms of vector calculus, or in terms of differential equations. In this module, we revise vector calculus and field theory in three dimensions, using Stokes' theorem and Gauss' theorem to solve explicit physical problems; we evaluate path, surface and volume integrals, and derive general electrodynamic laws. We also consider both the ordinary and partial differential equations arising from real world problems related to Maxwell's equations, and introduce some advanced methods for solving these (i.e. Fourier series, Fourier transforms, Laplace transforms), and further methods for approximating solutions (central difference methods in one and two dimensions).

GEOMECHANICS 2 (CIVE220)

Credits: 15 / Semester: semester 1

This module introduces students to the theoretical framework of geotechnical engineering. It emphasizes soil as a material and provides an introduction to the application of the theory to practical geotechnical engineering problems including bearing capacity of foundations, earth pressures on retaining walls and slope stability.

GROUP DESIGN PROJECT (CIVE263)

Credits: 15 / Semester: semester 2

The students are provided with a realistic design brief that needs to be met over the course of the semester. This is achieved via a defined set of realistic work stages which enables the students to produce an open-ended structural design within a group working environment, thus promoting teamwork and industrial awareness. The final deliverable will be the submission of structured design portfolio/sketchbook and oral presentation to academic members of staff and relevant industry partners.

PROGRAMMING FOR CIVIL ENGINEERS (CIVE286)

Credits: 7.5 / Semester: semester 2

Students will be introduced to the basic concepts of computer programming and Excel to solve engineering problems. Gain knowledge of basic procedural programming concepts. Become proficient in the use of Excel and Excel Macros. Enhance problem solving skills. Gain experience in solving engineering problems using a software tool.

STRUCTURAL ELEMENT DESIGN (CIVE241)

Credits: 15 / Semester: whole session

This module introduces students to the structural design concepts and applications of structural steelwork, reinforced concrete and other common building materials . The basic principles are covered and design examples (for design to the relevant sections of the Eurocodes) are given.

STRUCTURAL ENGINEERING IN THE BUILT ENVIRONMENT 2 (CIVE233)

Credits: 22.5 / Semester: whole session

This module builds on the first year with further exploration into topics introduced in "Structural Engineering in the Built Environment 1". Students are introduced to advanced and emerging materials used in Civil and Architectural Engineering, deeper theoretic and applied understanding of structural behaviour and systems and continue to develop their knowledge and understanding of industry standard structural design tools. All within the context of ensuring structures are constructed to ensure buildings and infrastructure assets are safe, resilient, sustainable, economical and buildable

ENVIRONMENTAL PLANNING AND INFRASTRUCTURE PROJECT (CIVE261)

Credits: 15 / Semester: semester 1

This module provides students with an introduction to thecontexts of transport and infrastructure, and the skills required by aprofessional engineer operating in this sector.

EXPERIMENTAL METHODS (ENGG201)

Credits: 7.5 / Semester: semester 1

The module focusses on the essentials of data analysis and interpretation, engineering experimentation, measurement techniques and principles of instrumentation.

Programme details and modules listed are illustrative only and subject to change.

YEAR THREE

The programme gives you the opportunity to undertake an individual research project in year three. Teaching staff offer projects based on their research expertise.

COMPULSORY MODULES

SUSTAINABLE DESIGN AND CONSTRUCTION MANAGEMENT (CIVE350)

Credits: 15 / Semester: whole session

Sustainability and Management are areas of professionalism that are very important within the construction industry and wider built environment sector. Both areas are also emerging as new and exciting career paths for many graduate civil engineers plus architectural engineers. On completion of this module, students will understand a range of approaches to designing for climate change adaptation and net-zero carbon implementation, as well as appreciate diverse management practices associated with modern methods of construction plus industry innovation. In addition, skills will be gained by students in career evaluation, market analysis, design appraisal, options review and project judgements, all linked to enhanced graduate employment and responsible decision-making as a professional engineer.

CONTEXT 3.1: HISTORY AND THEORY OF ARCHITECTURE (ARCH321)

Credits: 15 / Semester: semester 1

The module uses lectures from staff to introduce specialised research themes and topics in architectural history and theory, and is supported by group and individual research. Students are able to choose topics for which they would like to attend further group tutorials / seminars. The module is assessed by an MCQ exam (50%) and a 2,000-word essay (50%).

ENVIRONMENTAL DESIGN 3 (ARCH311)

Credits: 15 / Semester: semester 2

The aim of the course is to develop from user requirements an introduction to design of environmental systems for large buildings, selection of appropriate equipment and materials, and their integration into building fabric and structural systems. The three topics are Artificial Lighting, Acoustics, and Thermal Environment and are delivered by a mixture of lectures and case studies.

GEOTECHNICAL ENGINEERING (CIVE320)

Credits: 15 / Semester: semester 2

This module introduces students to the theory and methods that underpin geotechnical engineering practice. It covers the design of shallow and deep foundations, retaining walls, slopes and other structures according to Eurocode 7. In addition, it provides a comprehensive introduction to modern finite element methods and their application to geotechnical engineering.

INDIVIDUAL PROJECT (ENGG341)

Credits: 30 / Semester: whole session

The Year 3 individual research project; 300 hours student work over 2 semesters; 3 assessment stages (proposal 5%, interim 20%, final 75%).

OLD STRUCTURES OF STEEL, TIMBER AND MASONRY (CIVE334)

Credits: 15 / Semester: semester 2

It has been shown that the refurbishment of existing buildings is a more sustainable option than demolition and reconstruction as it leads to significant reductions in CO2 emissions. Additionally, the benefits of refurbishment (in comparison to new construction) extend beyond CO2 emissions and reduced energy expenditure: (i) less raw materials, (ii) less waste, (iii) heritage conservation and community retention and finally, (iv) well restored structures have a high economic value. This module gives students an insight into the structural appraisal and reuse of existing structures.

STRUCTURES 3 (CIVE344)

Credits: 7.5 / Semester: semester 1

This module introduces students to plastic structural analysis. At the member level the principle and method for assessing the load carrying capacity of a section is discussed. Topics covered at the structural level include principle and method behind collapse mechanisms, determining collapse loads by incrementally increasing load magnitude (incremental load analysis), and by investigation of the final incipient collapse state (plastic limit state analysis). Implications on limit state design are also discussed.

EARTHQUAKE ENGINEERING (CIVE342)

Credits: 7.5 / Semester: semester 1

This module aims at introducing students to earthquake engineering. It acquaints students with basic skills for analyzing the seismic response of structures subjected to earthquake excitations using structural dynamics principles. Background knowledge in engineering seismology will be covered to provide a comprehensive perspective to the topic. Seismic design principles are also introduced to provide a sound understanding of the rationale behind seismic codes.

Programme details and modules listed are illustrative only and subject to change.

HOW YOU'LL LEARN

We are leading the UK's involvement in the international Conceive-Design-Implement-Operate (CDIO) initiative – an innovative educational framework for producing the next generation of engineers.

Our degree programmes encompass the development of a holistic, systems approach to engineering. Technical knowledge and skills are complemented by a sound appreciation of the life-cycle processes involved in engineering and an awareness of the ethical, safety, environmental, economic, and social considerations involved in practicing as a professional engineer.

You will be taught through a combination of face-to-face teaching in group lectures, laboratory sessions, tutorials, and seminars. Our programmes include a substantial practical component, with an increasing emphasis on project work as you progress through to the final year. You will be supported throughout by an individual academic adviser.

HOW YOU'RE ASSESSED

Assessment takes many forms, each appropriate to the learning outcomes of the particular module studied. The main modes of assessment are coursework and examination. Depending on the modules taken, you may encounter project work, presentations (individual and/or group), and specific tests or tasks focused on solidifying learning outcomes.

LIVERPOOL HALLMARKS

We have a distinctive approach to education, the Liverpool Curriculum Framework, which focuses on research-connected teaching, active learning, and authentic assessment to ensure our students graduate as digitally fluent and confident global citizens.

Careers and employability

Our research-led teaching ensures that we incorporate the latest advances in cutting-edge engineering research. As well as achieving a degree qualification, you will graduate as an industry-ready engineer who has both practical experience and highly desirable skills to the engineering industry.

Studying this course will expose you to maximum opportunities for career prospects, graduate opportunities, and student summer placements specifically during the annual engineering careers fair with 30 blue chip companies attending (including Jaguar Land Rover, Nestle, Toyota, JCB, British Army, United Utilities, ABB Ltd, Network Rail, BAE Systems and many more).

Typical routes/roles available to graduates:

- Work experience opportunities – placements during the summer or for a full academic year in leading engineering companies.
- Postgraduate opportunities – MSc or PhD level

4 IN 5 **OF OUR ENGINEERING STUDENTS FIND THEIR MAIN ACTIVITY AFTER GRADUATION MEANINGFUL.**

Graduate Outcomes, 2018-19.

Fees and funding

Your tuition fees, funding your studies, and other costs to consider.

TUITION FEES

UK fees (applies to Channel Islands, Isle of Man and Republic of Ireland)	
Full-time place, per year	£9,250

International fees	
Full-time place, per year	£27,200

Fees are correct for the academic year 2024/25
Tuition fees cover the cost of your teaching and assessment, operating facilities such as libraries, IT equipment, and access to academic and personal support. Learn more about tuition fees, funding and student finance.

ADDITIONAL COSTS

We understand that budgeting for your time at university is important, and we want to make sure you understand any course-related costs that are not covered by your tuition fee. This includes a lab coat, safety boots, and a residential construction course.

Find out more about the additional study costs that may apply to this course.

SCHOLARSHIPS AND BURSARIES

We offer a range of scholarships and bursaries to provide tuition fee discounts and help with living expenses while at university.

Check out our Undergraduate Global Advancement Scholarship. This offers a tuition fee discount of up to £5,000 for eligible students starting an undergraduate degree from September 2024. There's also the Liverpool Bursary which is worth £2,000 per year for eligible students.

Discover our full range of undergraduate scholarships and bursaries

Entry requirements

The qualifications and exam results you'll need to apply for this course.

Your qualification	**Requirements** About our typical entry requirements
A levels	AAB including Mathematics. Applicants with the Extended Project Qualification (EPQ) are eligible for a reduction in grade requirements. For this course, the offer is **ABB** with **A** in the EPQ. You may automatically qualify for reduced entry requirements through our contextual offers scheme. If you don't meet the entry requirements, you may be able to complete a foundation year which would allow you to progress to this course. Available foundation years: • Engineering Foundation BEng (Hons) (4 year route including a Foundation Year at Carmel College)
GCSE	4/C in English and 4/C in Mathematics
Subject requirements	Mathematics For applicants from England: For science A levels that include the separately graded practical endorsement, a "Pass" is required.
BTEC Level 3 Subsidiary Diploma	Acceptable at grade Distinction* alongside BB at A level including A Level Mathematics.
BTEC Level 3 Diploma	Distinction* Distinction* in relevant BTEC considered alongside A Level Mathematics grade B. Accepted BTECs include Aeronautical, Aerospace, Construction, Mechanical, Mechatronics and Engineering.

Your qualification	**Requirements** About our typical entry requirements
BTEC Level 3 National Extended Diploma	D*DD in acceptable BTEC, plus B in A level Maths (not accepted without B in A level Maths)
International Baccalaureate	35 overall, including 5 at Higher Level Mathematics
Irish Leaving Certificate	H1,H1,H2,H2,H2,H3, including H2 in Higher Maths. We also require a minimum of H6 in Higher English or O3 in Ordinary English
Scottish Higher/Advanced Higher	Pass Scottish Advanced Highers with grades AAB including Mathematics
Welsh Baccalaureate Advanced	Acceptable at grade B alongside AA in A Levels including A Level Mathematics.
Cambridge Pre-U Diploma	D3 in Cambridge Pre U Principal Subject is accepted as equivalent to A-Level grade A M2 in Cambridge Pre U Principal Subject is accepted as equivalent to A-Level grade B Global Perspectives and Short Courses are not accepted.
Access	Considered if taking a relevant subject. Check with Department or Admissions team.
International qualifications	Many countries have a different education system to that of the UK, meaning your qualifications may not meet our entry requirements. Completing your Foundation Certificate, such as that offered by the University of Liverpool International College, means you're guaranteed a place on your chosen course.

ALTERNATIVE ENTRY REQUIREMENTS

- If your qualification isn't listed here, or you're taking a combination of qualifications, contact us for advice
- Applications from mature students are welcome.

THE ORIGINAL REDBRICK